



Comparison Among Different Decommissioning Funds Methodologies for Nuclear Installations

Final results of the project TREN/05/NUCL/S07.55436
on decommissioning financing in EU-27
on behalf of the European Commission, DG TREN, H2

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Wuppertal Institute and its Project Partners and Subcontractors
Wuppertal / London, January 2007

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Wuppertal Institute and its Partners and Subcontractors

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Background of Study

Decommissioning financing becomes more and more important

- **One third** of the 145 power reactors in the EU need to be **shut down by 2025**
- **Funding** of these decommissioning activities must be **adequate and available** when needed
- The **‘polluter pays’ principle** is broadly accepted
- Nuclear operators expected to accumulate **all** necessary funds
- **Different regimes** for estimating, collecting and managing decommissioning costs and funds exist across EU

Main Elements of Report

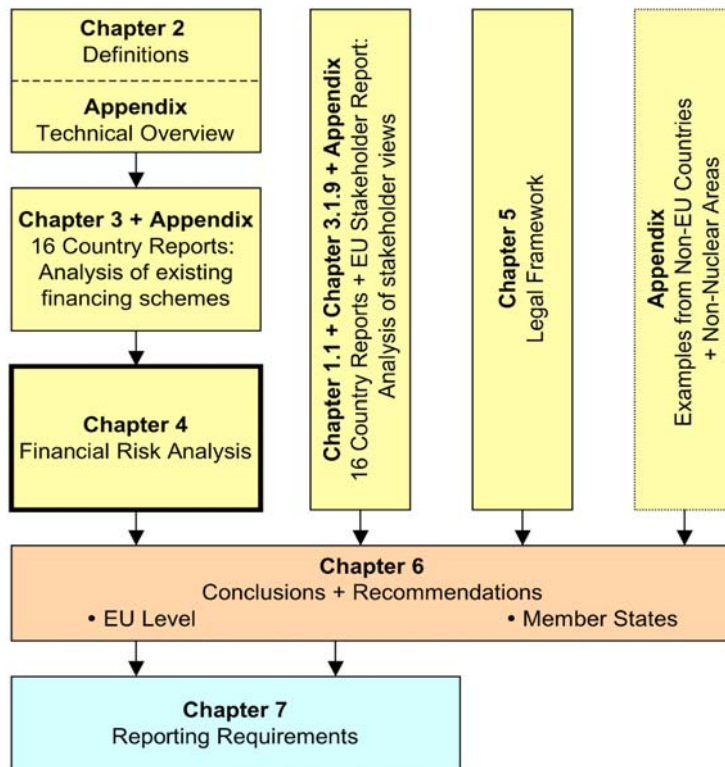
Special focus: Analysis of financial consequences and risks

- **Current decommissioning financing approaches** in Member States
- Analysis of the **financial consequences and risks** of the different decommissioning financing schemes
- **Legal framework** for dealing with these financial risks
- **Conclusions and Recommendations** for action on the EU and Member State level.

- *The report does not analyse how far the differences in the decommissioning financing methodologies distort the single market for electricity nor the validity of the cost estimates given.*

Schematic Diagramm of Report

7 Chapters + Appendix with 16 Country Reports, EU Stakeholder Report, Report on non-EU countries, Technical Overview



Decommissioning Financing Schemes in Member States

Analysis of current funds and stakeholder views

- **Assessment of activities in 16 Member States** which looks at:
 - The decommissioning **liabilities**
 - Strategies and **time schedules**
 - Approaches to quantify the decommissioning **costs**
 - Different methods of setting aside and managing **funds**
 - **Accessibility** of the operators of nuclear installations to the funds
 - How funding schemes deal with **early plant closure or other unforeseen events**
 - **Transparency** of the schemes to the public
 - **Stakeholders' opinion** of the financing system

Variation in Decommissioning Cost Estimates

Influencing factors

- A number of facts can be seen to impact upon the estimated costs of decommissioning, these are:
 - the **political-administrative framework** for decommissioning,
 - the **decommissioning strategy** chosen (immediate dismantling, deferred dismantling),
 - the cost **items** taken into account ('scope' of the cost estimate),
 - the **origin** of the cost estimate,
 - the **methodology** applied (generic rule, bottom-up modelling, sensitivity / scenario analysis, etc.), and
 - the way **risks and uncertainties** are taken into account.

Member States Preferred Strategies with regard to NPP

Immediate vs. deferred dismantling

Immediate dismantling	Deferred dismantling		No preference yet
Countries	Countries	Duration of safe enclosure	Countries
B D E F FIN (Loviisa) IT LT NL (Borssele) SI	BG CZ FIN (Olkiluoto) HU NL (Dodewaard) S UK	35 years 35 – 50 years 30 years 70 years 40 years 10 – 40 years up to > 100 years	SK RO

Consideration of Risks for Decommissioning Costs

Influencing factors

- For commercial nuclear power plants, the highest **risks and uncertainties** for decommissioning costs include:
 - **incidents and accidents** during operating and during decommissioning;
 - **political decisions** which change the framework conditions;
 - availability of **nuclear knowledge** at the time of the decommissioning activities;
 - unexpected evolution of radioactive **waste management, storage and disposal costs**;
 - and the **general economic development**.

Managing Decommissioning Funds

Different schemes how funds are set up in the different Member States

- Funding schemes require operator to **set aside funds during operation**. In **Sweden and Finland, full undiscounted amount** of decommissioning costs guaranteed from onset of production.
- However, most Member States require funds to be **gradually built up** during operation.
- Funds are either required to meet the **discounted or undiscounted** (overnight) decommissioning costs.

No provisions made	Provisions based on discounted costs				Provisions based on undiscounted costs
	for NPP in country:	for NPP in country:	Nominal discount rate applied	Inflation rate	
RO UK	D F S E NL SI LT HU B UK UK	5.5% 5.0% 4.0% 4.29% ? 	Indirectly 2.0% Indirectly 0.73% ? 	5.5% 2.94% various 1.5% 4.0% 3.53% 3.0% 3.0% ¹⁰ ? 2.2% 3.0%	D CZ SK IT FIN LT

Where are Funds held ?

Five types of decommissioning financing schemes

Kind of facility	Payment from current budget	Internal unrestricted	Internal restricted	External unrestricted	External restricted
Uranium mine/mill	e.g., D, CZ		e.g., F		
Research reactors	e.g., D, E, UK, IT, B	e.g., CZ	e.g., F, CZ		
NPP	UK (NDA)	D, B, NL, IT (SOGIN-ENEL), CZ	F, CZ	IT (CCSE)	FIN, LT, S, UK (NLF: British Energy), SK, E, BG, HU, SI
Uranium conversion, enrichment and fuel fabrication plants	UK	D, NL	F		
Reprocessing plants	D, UK		F		
Storage, disposal	e.g., D, UK		e.g., E, F, NL (COVRA)		e.g., FIN, S, CZ

Stakeholder Views

Scepticism towards regulation on EU level

- Many stakeholders, largely operating companies and Governments, are **quite satisfied with the present situation** in their countries and believe that adequate funds will be available when necessary.
- Furthermore, they largely have **concerns towards a process of harmonizing** decommissioning financing on the European level and substantially changing the present system.
- However, some of these stakeholders stressed the importance of introducing **some kind of general requirements or common criteria** on producers of nuclear energy with regard to decommissioning financing to ensure a level playing field in the EU.

Key insights from Country Reports

Summary of main observations from analysis of current schemes

- **'Polluter pays' principle** is widely accepted and should be basis for granting an operating license, as occurs in Finland
- Decommissioning of facilities **other than NPPs** must not be overlooked, in particular for high cost facilities, such as reprocessing plants (e. g., the estimated cost of decommissioning the Sellafield plant in the UK is € 58 billion) or facilities having experienced incidents or accidents (e.g. the A1 unit at Jaslovske Bohunice, in Slovak Republic)
- Cost estimates **vary substantially** depending on several factors and the methods applied (e.g. discount rate applied, time schedule for dismantling, etc.).
- Costs estimates are subject to high degree of **uncertainties and risks**, which has to be adequately dealt with.
- Not all Member States require that funds be managed **externally and segregated** from the operator, for example in Germany.
- Some Member States have been **increasing the restrictions** placed upon the decommissioning funds, e.g. in France.
- **Public influence and public information rights** differ between countries.

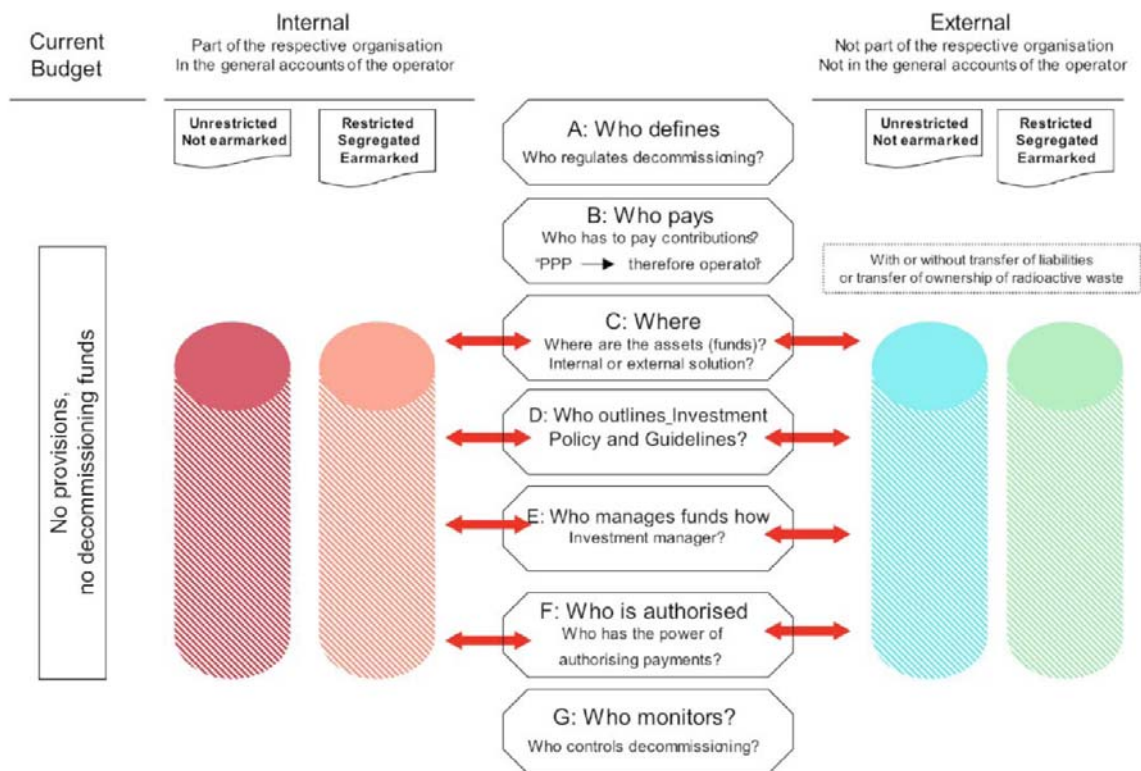
Analysis of Financial Consequences and Risks

Perspectives and underlying principles

- The **second main part of the report** includes a comprehensive assessment of the **financial consequences** of the decommissioning funding schemes from **accounting, valuation, governance and investment perspectives**.
- This is necessary to take into account both the **economic pressure** from the liberalized energy markets and financial markets and the **nuclear safety requirements**.
- There are three **underlying principles** governing the financial risk analysis which are:
 - the 'polluter pays principle' must apply as far as possible, with the operators of the nuclear installation regarded as the polluter;
 - that 'transparency is an important requirement'
 - and a high level of quality (best practice) of fund management is vital.

Decommissioning Governance Chain / Grid

Seven basic components



Governance Perspective

Potential conflict of interests => Additional checks and balances necessary

- Almost all weaknesses of governance of specific funding schemes are linked to degree of potential **conflict of interests** over the long time horizons envisaged
- To counter these, '**checks and balances**' have to be established, that go beyond legal requirements
- Fewer potential conflicts are found in **external funds**
- An ideal decommissioning scheme would entail:
 - Focus on **independence** of involved parties
 - Avoid situations where operator has **power of authority** to dispose of decommissioning funds
 - Reducing possibility of **use of decommissioning funds** for different purposes; funds should be separate or legally separated from other assets and liabilities.

Accounting Perspective

General Accepted Accounting Principles: Applying IFRSs

- Accounting approach defines which costs have to be **recognised and measured**
- **Different accounting standards** already exist which address key issues required for decommissioning funds:
 - EU : The fourth Council Directive 78/660/EEC of 25th July 1978 and the Seventh Council Directive 83/349/EEC of 13 June 1983.
 - International : The International Financing Reporting Standards (IFRSs®)
- There should be “**Generally Accepted Accounting Principles**” applied to each installation.
- The report recommends applying **IFRSs®** together with clarifications (EU interpretations and guidance)

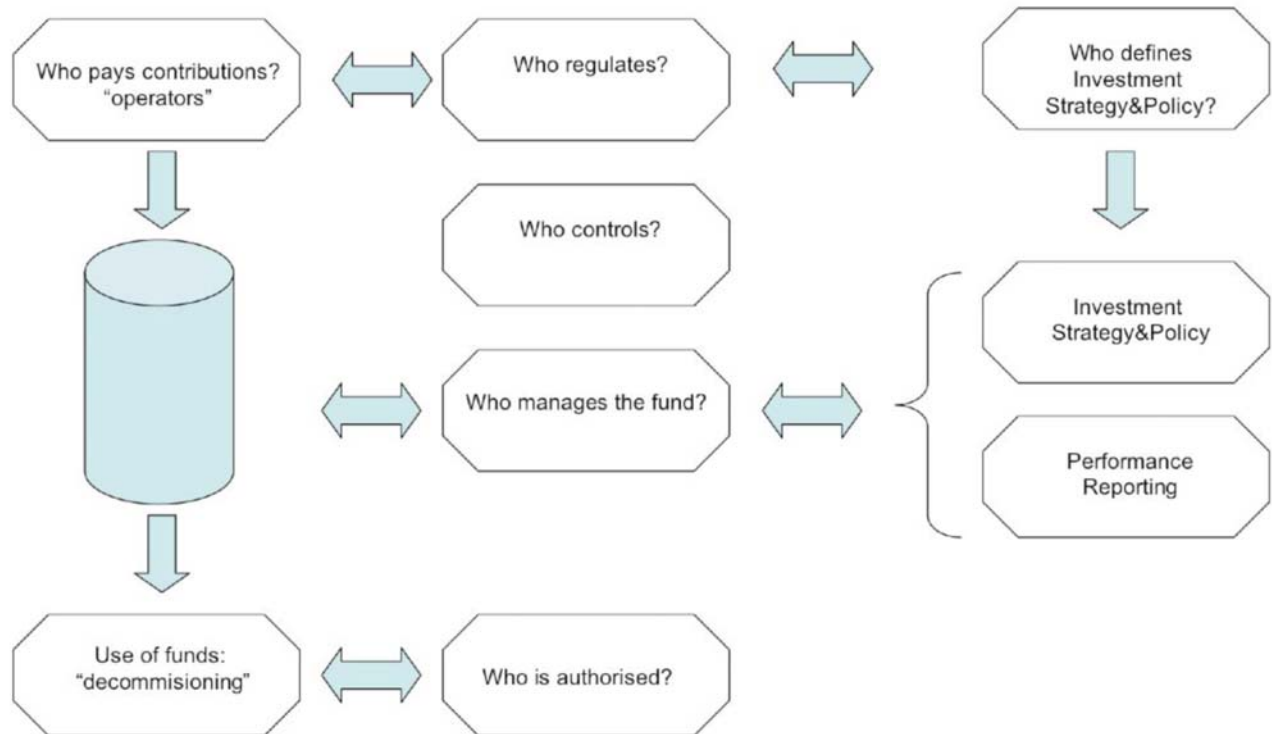
Valuation Perspective

Transparency is paramount

- **Valuation perspective** is important to investors
- A reliable valuation has to allow a **comprehensive risk assessment**.
- **Transparency is paramount** as key to minimising all effects linked to various factors of uncertainty and to assuring that investors receive a true and fair view of the financial position and performance.
- Transparency helps to **prevent wrong investment decisions** and thus inefficient allocation of financial resources.
- Most important element of valuation perspective is the **disclosure** of both, discounted and undiscounted amounts of decommissioning provisions/debts.

Investment Matrix of Decommissioning Funds

Main elements from the investment perspective



Investment Perspective

Guidelines needed for prudent and profitable asset and liability management

- **Decommissioning costs affect competitiveness** of operator and can potentially create large and unexpected expenditures.
- An incentive exists to finance part of future decommissioning costs through **high investment performance**.
- However, high performance investments can conflict with **prudence principle**
- It is recommended that **guidelines** be established that describe the framework for investments and qualification of investment managers.
- Long term timescales potentially allow more allocation to shares, as can be undertaken in the insurance industry (**asset and liability management**)
- A **guarantee scheme** should cover risks, which are added through the investment process in general and risks, which are linked to an incident or accident in particular

Legal Aspects

Future regulation on decommissioning financing to be based on EC Treaty

- Past and current efforts of the Commission to harmonise are all based on articles of the **Euratom Treaty** (especially Article 31)
- This create a **dilemma** as Euratom Treaty does not provide direct legal basis for legislative action on financing of decommissioning.
- Furthermore, it goes against **international rules of general interpretation** to extend competence of Euratom Treaty beyond the limits the treaty was originally granted, in particular in an area which is clearly regulated under the general Treaty of the European Communities (EC Treaty).
- Future legislative proposals should be based on the **EC Treaty**, especially **Article 95** together with **Article 175** on environmental grounds.

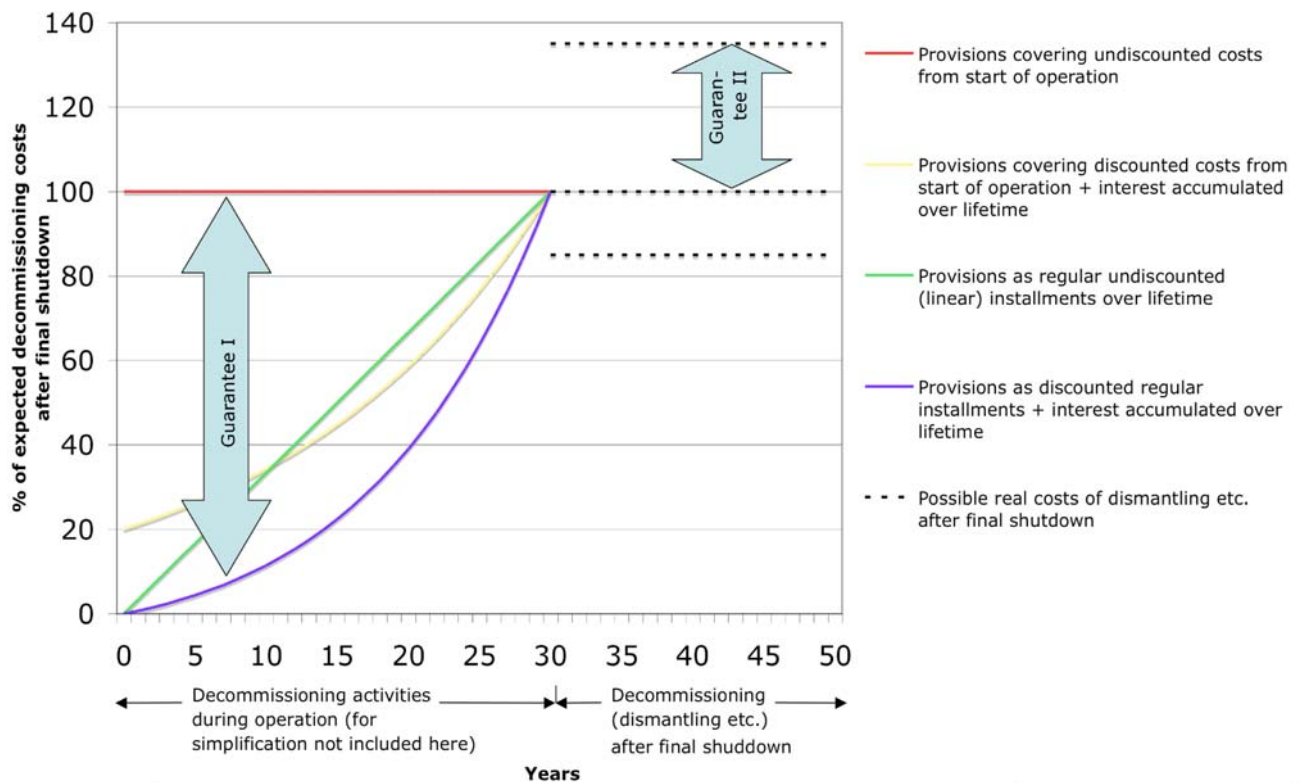
General Conclusions and Recommendations

Over-riding principles and general steps to eliminate / mitigate risks

- Funds should be **adequately available when needed**
- **Polluter pays principle to be** fully adhered
- **Public licensees** should not pay decommissioning costs from current budget
- Financing schemes should **eliminate or mitigate risks and uncertainties** as far as possible. Steps to achieve this include:
 - **Identification of risks / Uniform accounting treatment**
 - **Increasing transparency and clarity**
 - Assuring a **high degree of independence** between actors in Governance chain, through
 - Independence of licensing authority
 - Full independence of decommissioning fund from operator
 - Internal unrestricted decommissioning financing schemes do not secure minimum degree of independence necessary
 - Separate power of authority to disposed of collected means of finance from bodies responsible for collection and dispersal of funds
 - **Risk-adjusted investment policy**

Guarantee Scheme Required

Guarantee I covering risk of early shutdown - Guarantee II covering risks of insufficient funds available after the final shut down



First Steps proposed for EU Level

Increasing transparency and oversight

- **Regular uniform reports** produced by Member States
- Establishment of **Council (of trustees) of European Nuclear Decommissioning Funds (CENDF)** to
 - Act as focal point for contacts between Member States
 - Become interface on European Level between Member States and EU institutions
 - Agree on best practice
 - Contribute to a higher degree of harmonisation of decommissioning financing mechanism
- CENDF should not question existence of **Decommissioning Funding Group** initiated by the European Commission

Regulation of Decommissioning Funds at EU Level?

If current process to increase transparency and peer review is insufficient, binding legislation could be implemented and justified

- Recent experience suggest that **further legislative steps** on European level are **not feasible at present**
- However, if instead of Euratom Treaty, the **Treaty of the European Communities** (especially Article 95 and 175) were used, **further regulation would be justifiable**
- **If current process** to increase transparency and peer review is **insufficient** to harmonise practises and reduce risk, then harmonisation could be achieved through the introduction and implementation by Member States of **binding legislation**
- Further measures could include the establishment of a **European Nuclear Decommissioning Oversight Board (ENDOB)** which would have the authority in the setting of general principles and guidelines.

Reporting Requirements to Increase Transparency in EU

Three levels of data and information needed: From overall indicators to detailed plant- and country-specific decommissioning financing information

- **Primary:** Comprising of **five indicators** which reflect the **overall financing** of decommissioning and waste management activities in each Member State. These are the:
 - sum of the estimated undiscounted decommissioning costs for all installations;
 - sum of the provisions for decommissioning;
 - sum of possible costs covered by guarantees;
 - sum of assets in separate dedicated funds; and
 - the average sum of payments per year for decommissioning over the previous three years.
- **Secondary:** Will demonstrate the state of financing **for each individual nuclear facility**
- **Tertiary:** This will provide more detailed information on the **framework, procedure and rules** for the financing of decommissioning.

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